DEVICE AND METHOD FOR OPERATING A DISCHARGE LAMP

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The present invention relates to a device and method for operating a high-pressure discharge lamp.

High-intensity discharge (HID) lamps are operated during the steady state operation within a small power range to extend lamp life. Furthermore, during run-up operation the run-up current, i.e. the current directly after ignition, must satisfy strict conditions. The run-up current should be sufficient to allow a quick run-up, but not too large to damage the lamp.

In the drive circuitry for driving the lamp or ballast circuit, the power level during steady state and the current level during the run-up phase must be controlled. More specifically, in steady state the power supplied to the lamp should be kept in a narrow power band, independent of the lamp voltage (within the normal lamp specifications) and also the run-up current must be limited to fulfil the given lamp specifications.

Typically the ballast circuit for driving the lamp comprises a switched-mode power supply (SMPS) connected between the mains and the lamp. As HID lamps are susceptible to acoustic resonance at high frequencies, HID lamps are to be driven at relatively low frequency (typically 100 Hz) in a square-wave current operation.

In a three stage drive circuit design the switched-mode power supply for HID-applications comprises a first stage including a preconditioner, for example a double rectifier for rectifying the mains (230 V 50 Hz), combined with an up-converter. The second stage comprises a down-converter (DC-DC converter), also called a forward or buck converter, for stabilizing the output current. The third stage of the ballast circuit comprises a commutator half or full bridge (and ignitor) to implement the square-wave current operation. The above-mentioned power control during steady state and current control during run-up phase is implemented with a feedback loop. The actual output power level of the down-converter can be determined by means of measuring the input current of the down-converter. A control circuit is provided for controlling the output of the down-converter. Assuming the input voltage is constant, the input current of the down-converter is linearly related to the input power. Assuming further that the losses in the down-converter are constant, the control circuit is able to control the output power of the down-converter, based on the measured input